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Agreement reduces titanium machining time

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WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's Materials and Manufacturing Directorate's Manufacturing Technology Division (ManTech) entered into a Small Business Innovative Research (SBIR) agreement that resulted in a 30 percent reduction in titanium machining time.

The use of titanium and its alloys in aircraft manufacturing has continued to increase over time due to its high strength and low weight. Uses for titanium include discs, blades, shafts and casings for jet engines because it can operate at temperatures of sub-zero to 600-degrees Celsius. Structural engineers specify that titanium alloys be used on airframes in several capacities, as small as fasteners that weigh a few grams to large wing beams that weigh up to one ton.

ManTech entered into a SBIR contract with Third Wave Systems, Inc., in order to develop ways to cut both the time and cost of titanium machining.

Using Third Wave System's AdvantEdge finite element machining model, research began to find ways to accomplish the ManTech goal of cycle time reduction. AdvantEdge tests machining processes, such as the milling, drilling and turning processes, in order to improve the machining rates and tool performance. The software predicts cutting forces and temperatures in the tool, as well as in the work piece. The results are then used to optimize the cutting conditions.

During Phase I of the SBIR research, the software demonstrated the possibility of reducing costs and improving the rate of productivity. In Phase II, applying AdvantEdge and high speed machining technologies allowed for the reduction of machining time by 30 percent.

After Phase II, a Phase II Enhancement was granted to continue this research. During this enhancement, researchers enhanced the technology of the modeling and software in order to make it useful for computer numeric control programmers. As a result of this enhancement, Third Wave Systems has entered into another SBIR agreement with ManTech that will apply the technology to additional engine components with complicated design features. The model is also now being used by the Navy and the Department of Energy, in order to achieve cycle time reductions. @

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